Remarks

Applicants and their representatives wish to thank Examiner Trinh for the thorough examination of the present application and the detailed explanations in the final Office Action dated May 30, 2008.

The present claims relate to methods for making patterned semiconductor films. A first method for making such patterned semiconductor films comprises the steps of gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, a first cyclic Group IVA compound of the formula $(AH_x)_n$, where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and each A in the formula is independently Si or Ge, and a solvent in a pattern on a substrate; and curing the printed pattern to form the patterned semiconductor film, wherein curing the printed pattern comprises irradiating the printed pattern (cf. Claim 41 of the present application).

A second method for such making patterned semiconductor films comprises the steps of inkjet printing, gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, at least one cyclogermane of the formula $(GeH_x)_n$ or cyclosilagermane of the formula $(AH_x)_n$, where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and at least one first instance of A is silicon and at least one second instance of A is germanium, and a solvent in a pattern on a substrate; and curing the printed pattern to form the patterned semiconductor film, wherein curing the printed pattern comprises irradiating the printed pattern (cf. Claim 166 of the present application).

The present claims advantageously provide methods for printing patterned semiconductor solutions comprising passivated, silicon-containing semiconductor nanoparticles and a cyclic, hydrogenated silane, hydrogenated germane, or hydrogenated silagermane, and subsequent curing thereof to form a patterned semiconductor film. Patterned semiconductor film structures made according to the presently claimed methods have improved physical and/or electrical properties (e.g., conductivity, density, adhesion and/or carrier mobility), relative to structures made from nanoparticle inks without either passivated, silicon-containing semiconductor nanoparticles or a cyclic, hydrogenated silane, hydrogenated germane, or hydrogenated

silagermane. Furthermore, the presently claimed methods afford patterned semiconductor films of high quality, suitable for use in electronics applications, such as display devices or RFID tags, and can be formed by high-throughput printing processes.

The cited references (Shiho et al., U.S. Pat. App. Pub. No. 2003/0045632 [hereinafter, "Shiho"]; Jacobson et al., U.S. Pat. No. 6,294,401 [hereinafter, "Jacobson '401"]; Jacobson et al., U.S. Pat. No. 6,200,508 [hereinafter, "Jacobson '508"]; Beppu et al., U.S. Pat. No. 5,866,471 [hereinafter, "Beppu"]; Tani et al., U.S. Pat. No. 5,254,439 [hereinafter, "Tani"]; Kim et al., U.S. Pat. No. 6,355,198 [hereinafter, "Kim"]; and Korgel, U.S. Pat. App. Pub. No. 2003/0034486 [hereinafter, "Korgel"]) neither suggest nor render obvious, either alone or in combination, the presently claimed method of making patterned semiconductor films comprising the steps of gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, a first cyclic Group IVA compound of the formula $(AH_x)_n$, where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and each A in the formula is independently Si or Ge, and a solvent in a pattern on a substrate; and curing the printed pattern to form the patterned semiconductor film, wherein curing the printed pattern comprises irradiating the printed pattern (cf. Claim 41 of the present application).

In addition, the cited references neither suggest nor render obvious, either alone or in combination, the presently claimed method of making patterned semiconductor films comprising the steps of inkjet printing, gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, at least one cyclogermane of the formula $(GeH_x)_n$ or cyclosilagermane of the formula $(AH_x)_n$, where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and at least one first instance of A is silicon and at least one second instance of A is germanium, and a solvent in a pattern on a substrate; and curing the printed pattern to form the patterned semiconductor film, wherein curing the printed pattern comprises irradiating the printed pattern (cf. Claim 166 of the present application).

Furthermore, the rationale for combining the cited references fails to meet the standard for supporting an obviousness rejection under *KSR International Co. v. Teleflex Inc.* (*vide infra*). As a result, the present claims are patentable over the cited references.

To assist in evaluating the arguments herein, the Tables below summarize the cited references' disclosures relative to the limitations of the present Claim 41 (Table 1) and Claim 166 (Table 2). The claim limitations in the column headings of the Tables are short-hand notations for the actual limitations themselves, and should not necessarily be taken as an interpretation of the actual limitations.

Limitations of Independent Claim 41							
	Printing Methods						
Reference	Gravure	Offset Lithography	Flexographic	Pattern	Semiconductor Nanoparticles	Passivated	Cyclic Group IVA Compound
Shiho	no	no	no	no?	yes	no	yes
Jacobson '401	yes	no	no	yes	yes	no	no
Jacobson '508	no	no	no	no	yes?	no	no
Beppu	no	no	no	no	no	no	yes
Tani	no	no	no	no	no	no	no
Kim	no	no	no	no	no	no	no
Korgel	no	no	no	no	yes	yes	no

Table 1 – Disclosures of Cited References Relative to Claim 41 Elements.

Limitations of Independent Claim 166								
	Printing Methods							
Reference	Inkjet	Gravure	Offset Lithography	Flexographic	Pattern	Semiconductor Nanoparticles	Passivated	*c*-germane or *c*-silagermane
Shiho	yes	no	no	no	yes	yes	no	no
Jacobson '401	yes	yes	no	no	yes	yes	no	no
Jacobson '508	yes	no	no	no	no	yes?	no	no
Beppu	no	no	no	no	no	no	no	yes
Tani	no	no	no	no	no	no	no	no
Kim	no	no	no	no	no	no	no	no
Korgel	no	no	no	no	no	yes	yes	no

Table 2 – Disclosures of Cited References Relative to Claim 166 Elements.

The Rejection of Claims 41, 43, 44, 46, 56-61, 102-103, 111, 112, 125, 166-167 and 169-172 under 35 U.S.C. § 103(a)

The rejection of Claims 41, 43, 44, 46, 56-61, 102-103, 111, 112, 125, 166-167 and 169-172 under 35 U.S.C. § 103(a) as being unpatentable in view of Shiho, Jacobson '401 and Jacobson '508, and in further view of Beppu is respectfully traversed.

Shiho discloses silane compositions for preparing semiconductor thin films in solar cells (Abstract). Shiho further discloses several semiconductor thin films that may be formed from the silane compositions disclosed. For example, Shiho discloses a series of four components A – D that are the essential components of the compositions disclosed, and may be combined in various ways to form compositions. Component A is represented by the formula Si_nR_m, with R substituents being selected from hydrogen, alkyl, phenyl or halogens (cf. paragraph [0040]. Component B is at least one silane compound selected from the group consisting of cyclopentasilane, cyclohexasilane and silylcyclopentasilane (cf. paragraph [0050]). Component C is silicon particles (cf. paragraph [0060]), which may have a particle diameter of 0.005 to 1,000 μm (cf. paragraph [0061]), and may be amorphous or crystalline (cf. paragraph [0063]). Component D is at least one boron compound, arsenic compound, phosphorus compound, antimony compound or modified silane compound represented by the formula $Si_aX_bY_c$ (where X is a hydrogen atom and/or halogen atom, Y is a boron atom or phosphorus atom, a is an integer of 3 or more, b is an integer of 1 or more and a or less, and c is an integer of a or more and (2a+b+2) or less, cf. paragraph [0076]). In addition, Shiho discloses forming a silicon film on a substrate by forming the ***coating*** film of a silane composition on the substrate by means such as spray coating, roll coating, curtain coating, spin coating, screen printing, offset printing or ink jet printing (page 7, paragraphs [0106] and [0110]; emphasis added).

Shiho is silent with regard to a method for making patterned semiconductor films comprising gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, a cyclic Group IVA compound and a solvent ***in a pattern*** on a substrate (cf. Claim 41). To the extent that Shiho discloses forming a

silane composition on a substrate using an offset printing technique, it is understood by Applicants' undersigned representative that offset printing does not require lithography.

In addition, Shiho is also silent with regard to a method for making patterned semiconductor films comprising inkjet, gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, ***at least one cyclogermane or cyclosilagermane*** and a solvent ***in a pattern*** on a substrate (cf. Claim 166). To the extent that Shiho discloses inkjet printing a composition, it is of a silane composition. Shiho neither discloses nor suggests at least one cyclogermane or cyclosilagermane as recited in the present Claim 166.

Furthermore, to the extent that Shiho discloses any semiconductor particles, they are silicon particles (component C, *vide supra*). Shiho is silent with respect to the ***passivated*** semiconductor nanoparticles recited in the present Claims 41 and 166.

Finally, Shiho does not provide any reason or motivation to combine ***passivated*** semiconductor nanoparticles with a cyclic Group IVA compound and a solvent to form a solution, then gravure printing, printing by offset lithography, or flexographic printing such a solution ***in a pattern*** on a substrate, to arrive at the method of Claim 41. Nor does Shiho provide any reason or motivation to combine ***passivated*** semiconductor nanoparticles with ***at least one cyclogermane or cyclosilagermane*** and a solvent to form a solution, then inkjet printing, gravure printing, printing by offset lithography, or flexographic printing such a solution ***in a pattern*** on a substrate, to arrive at the method of Claim 166. As a result, Shiho is deficient with respect to the present Claims 41 and 166.

Jacobson '401 fails to remedy the deficiencies of Shiho.

Jacobson '401 discloses a method for making electronic, chemical, and mechanical devices by deposition and patterning nanoparticles through printing technology (Abstract). Jacobson further discloses a method for depositing and patterning nanoparticles suspended in liquid onto a substrate using a wide variety of processes, including ink jetting, spincoating, casting, lithography, gravure printing, screen printing, impact printing, stamping, contact printing

(whereby a liquid or solid pattern is transferred from a plate, stamp or cylinder), or transfer onto the substrate through a mask (col. 5, ll. 34-40).

Jacobson '401 discloses depositing and patterning particles suspended in liquid onto a substrate using a variety of processes, including lithography. However, lithography is a relatively broad term and does not necessarily suggest printing by offset lithography to one of ordinary skill in the art. For example, optical lithography is a common technique for making patterns on integrated circuits, but as disclosed by Jacobson '401, it does not appear to be immediately applicable to offset lithography (see, e.g., Wolf et. al., *Silicon Processing For The VLSI ERA*, Vol. 1, Second Edition, 2000, Lattice Press, pp. xviii-xxi, 488, and 545; submitted January 16, 2008). Thus, Jacobson '401, like Shiho, does not inherently or explicitly disclose printing by offset lithography. In addition, Jacobson '401 is silent with regard to making a patterned semiconductor film by flexographic printing a solution containing semiconductor nanoparticles and either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166).

Jacobson '401 discloses (among a variety of printing methods) gravure printing of nanoparticles suspended in liquid. However, Jacobson '401 is silent with regard to a method for making patterned semiconductor films comprising gravure printing, printing by offset lithography, or flexographic printing a solution comprising ***passivated*** semiconductor nanoparticles, ***a cyclic Group IVA compound*** and a solvent in a pattern on a substrate (cf. Claim 41). In addition, Jacobson '401 is also silent with regard to a method for making patterned semiconductor films comprising inkjet, gravure printing, printing by offset lithography, or flexographic printing a solution comprising ***passivated*** semiconductor nanoparticles, ***at least one cyclogermane or cyclosilagermane*** and a solvent in a pattern on a substrate (cf. Claim 166).

In fact, one of ordinary skill in the art might not have a reasonable expectation of success in the presently claimed method of printing an ink containing passivated semiconductor nanoparticles and either (1) a cyclic Group IVA compound or (2) a cyclogermane or cyclosilagermane in a pattern on a substrate. For example, certain properties of cyclic Group IVA compounds, cyclogermanes and cyclosilagermanes, such as volatility, viscosity, and surface

tension, might have been expected to render such an ink unsuitable for certain applications such as printing in a pattern. As a result, Jacobson '401 does not appear to suggest printing a solution comprising passivated semiconductor nanoparticles and either ***a cyclic Group IVA compound*** (cf. Claim 41), or ***at least one cyclogermane or cyclosilagermane*** (cf. Claim 166), ***in a pattern*** on a substrate. In the absence of a compelling reason for a person of ordinary skill in the art to make the presently claimed combinations, there is reasonable doubt as to the Office's justification for making the claimed combinations.[a]

Furthermore, to the extent that Jacobson '401 discloses any semiconductor nanoparticles, they are merely mentioned as one of the representative classes of nanoparticles, including insulators (e.g., silicon dioxide); semiconductors (e.g., silicon or cadmium selenide); and conductors (e.g., silver; cf. col. 3, ll. 39-43). Jacobson '401 is silent with respect to the passivated semiconductor nanoparticles recited in the present Claims 41 and 166. Furthermore, Jacobson '401 is silent with respect to either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166).

Finally, Jacobson '401, like Shiho, does not provide any reason or motivation to combine passivated semiconductor nanoparticles with either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166), then gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 41), or inkjet printing, gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 166) a solution of the same in a pattern on a substrate, to arrive at the presently claimed methods of making patterned semiconductor films. As a result, Jacobson '401 fails to remedy all of the deficiencies of Shiho.

Jacobson '508 fails to remedy the deficiencies of Shiho and Jacobson '401.

Jacobson '508 discloses a method of utilizing printing techniques to build three dimensional structures by depositing successive layers of a device onto a substrate (Abstract). Jacobson '508 further discloses a method employing a conventional ink jet technique to

[a] See the discussion *infra* of *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727 at 1741; 167 L. Ed. 2d 705; 82 USPQ2d 1385.

accomplish depositing the successive layers onto a substrate to build three dimensional structures, such as miniature switches, motors, and the like (col. 1, ll. 16 and 33-45). Jacobson '508 then discloses a method of depositing an ink comprising particles that may consist of such materials as silicon, germanium, GaAs, or other suitable semiconductive materials in a vehicle, in which the vehicle may be a vinyl or other resin that is heat curable or UV curable or any other suitable binder known in the art of electrically conducting inks (col. 2, ll. 31-35 and 44-46, and Fig. 1A).

Jacobson '508 is silent with regard to a method for making patterned semiconductor films comprising gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, a cyclic Group IVA compound and a solvent ***in a pattern*** on a substrate (cf. Claim 41). Jacobson '508 is also silent with regard to a method for making patterned semiconductor films comprising inkjet, gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, ***at least one cyclogermane or cyclosilagermane*** and a solvent ***in a pattern*** on a substrate (cf. Claim 166).

In addition, Jacobson '508 is silent with respect to the passivated semiconductor nanoparticles recited in the present Claims 41 and 166. Furthermore, Jacobson '508 is silent with respect to either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166).

Finally, Jacobson '508, like Shiho and Jacobson '401, does not provide any reason or motivation to combine passivated semiconductor nanoparticles with either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166), and a solvent to form a solution, then gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 41), or inkjet printing, gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 166) such solutions in a pattern on a substrate, to arrive at the presently claimed methods of making patterned semiconductor films. As a result, Jacobson '508 fails to remedy the deficiencies of Shiho and Jacobson '401.

Beppu fails to remedy the deficiencies of Shiho, Jacobson '401, and Jacobson '508 with respect to the present Claim 41.

Beppu discloses a silicon thin film that is formed by coating on a substrate a solution of polysilane represented by the general formula -- $(SiR^1_2)_n$ --, where R^1 substituents are selected from the group consisting of hydrogen, an alkyl group having two or more carbon atoms and a β-hydrogen, a phenyl group, and a silyl group, and thermally decomposing the polysilane to deposit silicon (Abstract). Beppu further discloses a silane or germane compound having a one-dimensional chain (linear) or a cyclic structure, in which these compounds may be a copolymer or a mixture (col. 5, ll. 21-24). Beppu then discloses that these compounds may be ***coated*** on a large flat surface or curved surface using any ***coating method*** such as dipping, spin coating, and spray coating (col. 6, ll. 52-54; emphasis added).

Beppu is silent with respect to any semiconductor nanoparticles, much less the passivated semiconductor nanoparticles recited in the present Claims 41 and 166. Thus, Beppu does not disclose or suggest a method for making patterned semiconductor films comprising ***gravure printing***, ***printing by offset lithography***, or ***flexographic printing*** a solution comprising ***passivated semiconductor nanoparticles***, a cyclic Group IVA compound and a solvent ***in a pattern*** on a substrate (cf. Claim 41). Beppu is also silent with regard to a method for making patterned semiconductor films comprising inkjet printing, gravure printing, printing by offset lithography, or flexographic printing a solution comprising ***passivated semiconductor nanoparticles***, at least one cyclogermane or cyclosilagermane and a solvent ***in a pattern*** on a substrate (cf. Claim 166).

Furthermore, Beppu, like Shiho, Jacobson '401 and Jacobson '508, does not provide any reason or motivation to combine passivated semiconductor nanoparticles with either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166), and then gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 41), or inkjet printing, gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 166) a solution of the same in a pattern on a substrate, to arrive at the presently claimed methods of making patterned semiconductor films. As a result, Beppu fails to

remedy the deficiencies of Shiho, Jacobson '401 and Jacobson '508 with respect to the present Claims 41 and 166.

For the sake of argument, even if one of ordinary skill in the art were to modify the disclosures of the cited references, and combine the modified disclosures in a manner resulting in the methods of the present Claims 41 and 166, none of the cited references provide any plausible reason or motivation for doing so. A patent claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. It can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. In addition, rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.[b] In other words, why would one of ordinary skill in the art pick and choose from the disclosures of the cited references, modify those elements in manner that would yield the presently claimed method for making a patterned semiconductor film? Such a reason has not been provided by the Examiner, and the reason whereby a person of ordinary skill in the field of the invention would make a claimed combination cannot come from the Applicants' invention itself.[c]

To assert that one of ordinary skill in the art would appreciate the present invention from the disparate disclosures of the cited references, and modify those disclosures in the manner necessary to arrive at the invention, without reason or suggestion in the references to do so or on any other reasonable basis, is a classic hindsight reconstruction of the invention. One cannot use hindsight reconstruction to pick and choose among isolated disclosures in the cited references to

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[b] *KSR International Co. v. Teleflex Inc.,* 127 S. Ct. 1727 at 1741; 167 L. Ed. 2d 705; 82 USPQ2d 1385.

[c] *In re Oetiker*, 977 F.2d 1443, 1447; 24 USPQ2d 1443 (Fed. Cir. 1992); citing *Diversitech Corp. v. Century Steps, Inc.*, 850 F.2d 675, 678-79, 7 USPQ2d 1315, 1318 (Fed. Cir. 1988); *In re Geiger*, 815 F.2d 686, 687, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987); *Interconnect Planning Corp. v. Feil*, 774 F.2d 1132, 1147, 227 USPQ 543, 551 (Fed. Cir. 1985).

deprecate the claimed invention.[d] To use the patent [application] as a guide through the cited references, combining the right disclosures in the right way to arrive at the result of the claimed invention, is improper.[e]

Shiho, Jacobson '401, Jacobson '508 and Beppu neither disclose nor suggest, either alone or in combination, the passivated semiconductor nanoparticles recited in the present Claims 41 and 166. In addition, none of Shiho, Jacobson '401, Jacobson '508 and Beppu discloses or suggests either offset lithography or flexographic printing as recited in the present Claims 41 and 166. Furthermore, Shiho, Jacobson '508 and Beppu are each silent with respect to gravure printing. Jacobson '401 discloses gravure printing, but of a different solution, and thus does not suggest gravure printing the solutions recited in the present Claims 41 and 166 (*vide supra*). Shiho, Jacobson '401, Jacobson '508 disclose inkjet printing, but not a solution comprising ***at least one cyclogermane or cyclosilagermane*** as recited in the present Claim 166 (*vide supra*).

As a result, none of Shiho, Jacobson '401, Jacobson '508 and Beppu neither suggest nor render obvious, either alone or in combination, the presently claimed methods of making patterned semiconductor films comprising gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, a first cyclic Group IVA compound a solvent in a pattern on a substrate (cf. Claim 41), or inkjet printing, gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, at least one cyclogermane or cyclosilagermane and a solvent in a pattern on a substrate (cf. Claim 166).

Even if one were to modify the cited references to arrive at the presently claimed methods, the cited references fail to provide any reason or motivation to combine passivated semiconductor nanoparticles with either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166), and then gravure printing, printing by

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[d] *In re* Fine, 837 F.2d 1071, 1075, 5 U.S.P.Q.2d 1596, 1600 (Fed. Cir. 1988); see also *In re* Pleudemann, 910 F.2d 823, 828, 15 U.S.P.Q.2d 1738, 1742 (Fed. Cir. 1990); and *Uniroyal, Inc. v. Rudkin-Wiley Corp.*, 837 F.2d 1044, 1051, 5 U.S.P.Q.2d 1434, 1438 (Fed. Cir. 1988).

[e] See, e.g., *Medtronic, Inc. v. Daig Corp.*, 611 F. Supp. 1498, 1534, 227 U.S.P.Q. 509, 535 (D. Minn. 1985), *aff'd* 789 F.2d 903, 229 U.S.P.Q. 664 (Fed. Cir. 1986).

offset lithography, or flexographic printing (cf. Claim 41), or inkjet printing, gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 166) a solution thereof in a pattern on a substrate. Such a reason has not been provided by the Examiner, and the reason whereby a person of ordinary skill in the field of the invention would make a claimed combination cannot come from the applicant's invention itself (*vide supra*). Thus, the rationale for combining Shiho, Jacobson '401, Jacobson '508 and Beppu to yield the presently claimed methods for making a patterned semiconductor film fails to meet the standard for supporting an obviousness rejection under *KSR International Co. v. Teleflex Inc.* (*vide supra*). As a result, no combination of Shiho, Jacobson '401, Jacobson '508 and Beppu renders obvious the present Claims 41 and 166.

Therefore, Claims 41 and 166 are patentable over Shiho, Jacobson '401 and Jacobson '508 and Beppu. Claims 43, 44, 46, 58-61, 103, 111, 112 and 125 depend from Claim 41, and include all the limitation thereof. Claims 56, 57, 167 and 169-172 depend from Claim 166, and include all the limitation thereof. Thus, the rejection of Claims 41, 43, 44, 46, 56-61, 102-103, 111, 112, 125, 166-167 and 169-172 under 35 U.S.C. § 103(a) as being unpatentable in view of Shiho, Jacobson '401 and Jacobson '508, and in further view of Beppu is improper, and should be withdrawn.

The Rejection of Claims 51, 53, 54, 168, 204 and 205 under 35 U.S.C. § 103(a)

The rejection of Claims 51, 53, 54, 168 and 204-205 under 35 U.S.C. § 103(a) as being unpatentable over Shiho, Jacobson '401, Jacobson '508 and Beppu, and in further view of Tani is respectfully traversed.

As stated above, Shiho, Jacobson '401, Jacobson '508 and Beppu neither disclose nor suggest the presently claimed methods of making patterned semiconductor films recited in Claims 41 and 166. Furthermore, the rationale for combining Shiho, Jacobson '401, Jacobson '508 and Beppu fails to meet the standard for supporting an obviousness rejection under *KSR International Co. v. Teleflex Inc.* (*vide supra*). As a result, no combination of Shiho, Jacobson '401, Jacobson '508 and Beppu renders obvious the present Claims 41 and 166.

Tani fails to remedy the deficiencies of Shiho, Jacobson '401, Jacobson '508 and Beppu.

Tani discloses a method for preparing a polymer having linear –Si-O-Si- bonds and –Si-Si-Si- bonds, or polysilane bonds that are greater than trisilane bonds under oxidation with oxygen plasma to form SiO_2 resistant to oxygen dry etching, that is sensitive to far ultraviolet rays and suitable as a single layered resist or an upper resist of a two-layered system (Abstract). Tani further discloses a method for forming a resist pattern using the previously mentioned polymer by selectively irradiated an upper resist layer (3) with pulses of KrF excimer laser rays (4) through a mask carrying a desired pattern (col. 6, ll. 16-20 and Fig. 2C).

Tani is silent with regard to a method for making patterned semiconductor films comprising gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, a cyclic Group IVA compound and a solvent in a pattern on a substrate (cf. Claim 41). Tani is also silent with regard to a method for making patterned semiconductor films comprising inkjet, gravure printing, printing by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles, at least one cyclogermane or cyclosilagermane and a solvent in a pattern on a substrate (cf. Claim 166).

In addition, Tani is silent with respect to the passivated semiconductor nanoparticles recited in the present Claims 41 and 166. Furthermore, Tani is silent with respect to either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166).

Finally, Tani, like Shiho, Jacobson '401, Jacobson '508 and Beppu, does not provide any reason or motivation to combine passivated semiconductor nanoparticles with either a cyclic Group IVA compound (cf. Claim 41), or at least one cyclogermane or cyclosilagermane (cf. Claim 166), and then gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 41), or inkjet printing, gravure printing, printing by offset lithography, or flexographic printing (cf. Claim 166) a solution thereof in a pattern on a substrate. As a result, Tani fails to remedy the deficiencies of Shiho, Jacobson '401, Jacobson '508 and Beppu with respect to the present Claims 41 and 166.

Therefore, Claims 41 and 166 are patentable over Shiho, Jacobson '401, Jacobson '508, Beppu and Tani. Claims 51, 53, 54 and 204 depend from Claim 41, and include all the limitations thereof. Claims 168 and 205 depend from Claim 166, and include all the limitations thereof. As a result, the rejection of Claims 51, 53, 54, 168 and 204-205 under 35 U.S.C. § 103(a) as being unpatentable in view of Shiho, Jacobson '401, Jacobson '508 and Beppu, and in further view of Tani is improper, and should be withdrawn.

The Rejection of Claims 62-65 and 160-164 under 35 U.S.C. § 103(a)

The rejection of Claims 62-65 and 160-164 under 35 U.S.C. § 103(a) as being unpatentable over Shiho, Jacobson '401, Jacobson '508 and Beppu, and in further view of Kim is respectfully traversed.

As stated above, Shiho, Jacobson '401, Jacobson '508 and Beppu neither disclose nor suggest the presently claimed methods of making patterned semiconductor films recited in Claims 41 and 166. Furthermore, the rationale for combining Shiho, Jacobson '401, Jacobson '508 and Beppu fails to meet the standard for supporting an obviousness rejection under *KSR International Co. v. Teleflex Inc.* (*vide supra*). As a result, no combination of Shiho, Jacobson '401, Jacobson '508 and Beppu renders obvious the present Claims 41 and 166. As a result, no combination of Shiho, Jacobson '401, Jacobson '508 and Beppu renders obvious the present Claim 41.

Kim fails to remedy the deficiencies of Shiho, Jacobson '401, Jacobson '508 and Beppu.

Kim discloses that chemically or biochemically active agents or other species are patterned on a substrate surface by providing a micromold having a contoured surface and forming, on a substrate surface, a chemically or biochemically active agent or fluid precursor of a structure (Abstract). Kim further discloses that the invention provides techniques for derivatizing surfaces, biologically, chemically, or physically, according to predetermined patterns. The derivatized surfaces find a variety of uses in a variety of technical areas, or a

structure formed on the surface can be removed from the surface and find utility separate from the surface (col. 4, ll. 36 – 41).

Kim is silent with regard to a method of making a patterned semiconductor film comprising flexographic printing, printing by offset lithography, or gravure printing a solution comprising passivated semiconductor nanoparticles, a cyclic Group IVA compound, and a solvent in a pattern on a substrate, as recited in the present Claim 41.

In addition, Kim is silent with respect to the passivated semiconductor nanoparticles recited in the present Claim 41. Furthermore, Kim is silent with respect to the cyclic Group IVA compound recited in the present Claim 41.

Finally, Kim, like Shiho, Jacobson '401, Jacobson '508 and Beppu, does not provide any reason or motivation to combine passivated semiconductor nanoparticles with a cyclic Group IVA compound, and then gravure printing, printing by offset lithography, or flexographic printing a solution thereof in a pattern on a substrate. As a result, Kim fails to remedy the deficiencies of Shiho, Jacobson '401, Jacobson '508 and Beppu with respect to the present Claim 41.

Therefore, Claim 41 is patentable over Shiho, Jacobson '401, Jacobson '508, Beppu and Kim. Claims 62-65 and 160-164 depend from Claim 41, and include all the limitations thereof. As a result, the rejection of Claims 62-65 and 160-164 under 35 U.S.C. § 103(a) as being unpatentable in view of Shiho, Jacobson '401, Jacobson '508 and Beppu, and in further view of Kim is improper, and should be withdrawn.

The Rejection of Claims 135-138 under 35 U.S.C. § 103(a)

The rejection of Claims 135-138 under 35 U.S.C. § 103(a) as being unpatentable over Shiho, Jacobson '401, Jacobson '508 and Beppu, and in further view of Korgel is respectfully traversed.

As discussed above, Shiho, Jacobson '401, Jacobson '508 and Beppu neither disclose nor suggest a method of making patterned semiconductor films comprising gravure printing, printing

by offset lithography, or flexographic printing a solution comprising passivated semiconductor nanoparticles and a cyclic Group IVA compound a solvent in a pattern on a substrate, as recited in the present Claim 41. Furthermore, the rationale for combining Shiho, Jacobson '401, Jacobson '508 and Beppu fails to meet the standard for supporting an obviousness rejection under *KSR International Co. v. Teleflex Inc.* (*vide supra*). As a result, no combination of Shiho, Jacobson '401, Jacobson '508 and Beppu renders obvious the present Claim 41.

Korgel fails to remedy the deficiencies of Shiho, Jacobson '401, Jacobson '508 and Beppu.

Korgel discloses a method for production of a robust, chemically stable, crystalline, passivated nanoparticles and composition containing the same, that emits light with high efficiencies and size-tunable and excitation energy tunable color (Abstract). In addition, Korgel discloses a method of forming nanocrystalline or amorphous particles, having an average diameter of between about 1 to about 100 Å from Group IVA metals, by the thermal degradation of a precursor molecule in the presence of molecules that bind to the particle surface, referred to as a capping agent, at high temperatures and elevated pressures (page 1, paragraph [0010] and page 3, paragraph [0032]).

Korgel is silent with regard to a method of making a patterned semiconductor film comprising flexographic printing, printing by offset lithography, or gravure printing a solution comprising passivated semiconductor nanoparticles, a cyclic Group IVA compound, and a solvent in a pattern on a substrate, as recited in the present Claim 41. In addition, Korgel is silent with respect to the cyclic Group IVA compound recited in the present Claim 41.

Finally, Korgel, like Shiho, Jacobson '401, Jacobson '508 and Beppu, does not provide any reason or motivation to combine passivated semiconductor nanoparticles with a cyclic Group IVA compound, then gravure printing, printing by offset lithography, or flexographic printing a solution of the same in a pattern on a substrate. As a result, Korgel fails to remedy the deficiencies of Shiho, Jacobson '401, Jacobson '508 and Beppu with respect to the present Claim 41.

Therefore, Claim 41 is patentable over Shiho, Jacobson '401, Jacobson '508, Beppu and Korgel. Claims 135-138 depend from Claim 41, and include all the limitations thereof. As a result, the rejection of Claims 135-138 under 35 U.S.C. § 103(a) as being unpatentable in view of Shiho, Jacobson '401, Jacobson '508 and Beppu, and in further view of Korgel is improper, and should be withdrawn.

Conclusions

In view of the above amendments and remarks, all bases for rejection are overcome, and the application is in condition for allowance. Early notice to that effect is earnestly requested.

If it is deemed helpful or beneficial to the efficient prosecution of the present application, the Examiner is invited to contact Applicant's undersigned representative by telephone.

Respectfully submitted,

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